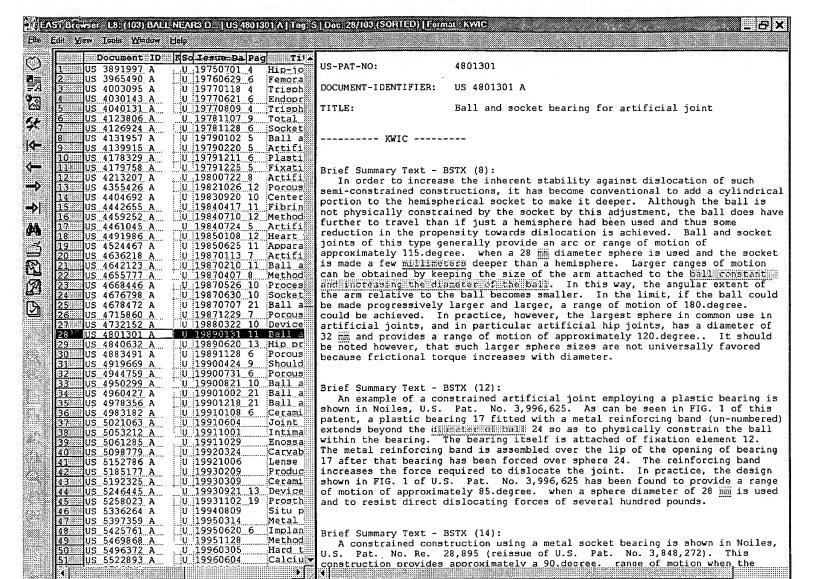
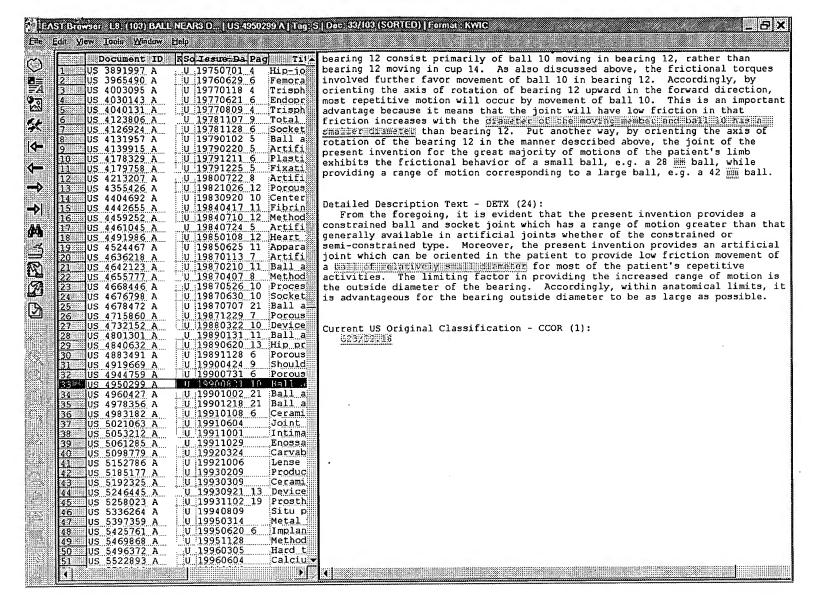
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2	138	(623/22.18,22.12,22.22,22.23,22.24,23.4).C		2003/09/20
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4	5	623/22.\$.ccls. and ovoid	USPAT;	2003/09/20
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5	16	623/\$.ccls. and ovoid with head	USPAT;	2003/09/20
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6	2	WO-9521212\$.did.	USPAT;	2003/09/20
	_		US-PGPUB;	11:11
			EPO; JPO;	
			DERWENT	
17	175	ball near3 diameter and 623/\$.ccls.	USPAT;	2003/09/20
'			US-PGPUB;	11:12
			EPO; JPO;	
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8	· 103	ball near3 diameter and 623/\$.ccls. and	USPAT;	2003/09/20
١	103	(mm or millimeters)	US-PGPUB;	11:13
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US 5185177 A

US 5192325 A

US 5246445 A

US 5336264 A

US 5397359 A

US 5425761 A

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SC US 5496372 A

45 US 5258023 A

35 US 4978356 A 36 US 4983182 A 37 US 5021063 A

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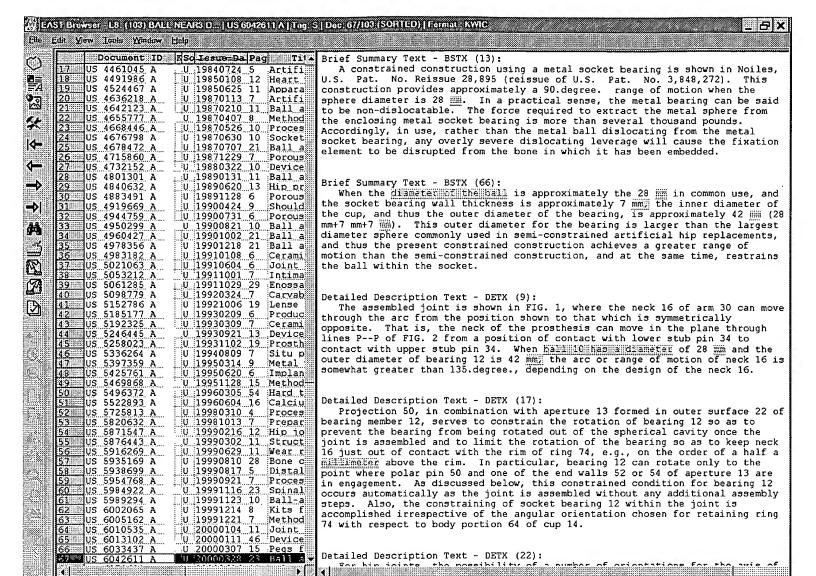
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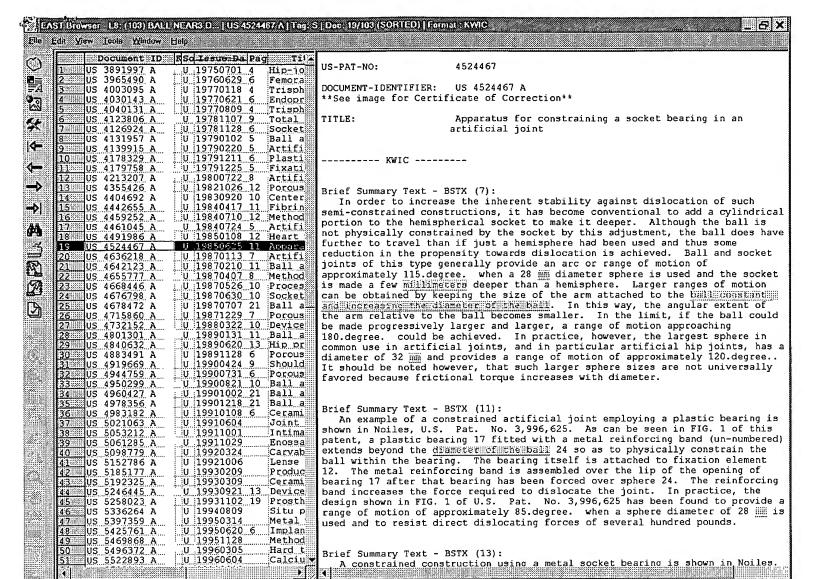
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The acetabular shell body AH1 is enclosed by metal molds 01 and 02. FIG. 31 is a sectional view taken on line II--II of FIG. 30. The metal molds 01 and 02 have an external shape obtained by dividing a cylinder measuring 70 mm in outer diameter and 50 mm in height into two pieces on the flat plane including the central axis of the cylinder. Inside the molds, a hemispheric bore 03 with a diameter of 50.5 mm is provided to allow the thin sheet AH7 to be formed around the entire circumference of the acetabular porous lamination component accommodation section AH9. When the acetabular shell body AH1 and ten pieces of the thin sheets AH7 are inserted in the metal molds 01 and 02 provided as described above, and the metal molds are made contact with each other at their division surfaces, the thin sheets AH7 are deformed into a hemispheric form inside the acetabular porous lamination component accommodation section AH9. To make the metal molds 01 and 02 contact with each other, screws can be used to pull the molds. The thin sheets AH6 can also be bent by pressing them against a cylindrical shaft with a diameter of 50 mm beforehand. By heating the thin sheets AH7 to about 900 degree. C. in the vacuum furnace, the acetabular porous lamination component accommodation section AH9 is bonded to the surface of the acetabular shell body AH1. To form a hemispherical porous lamination component, it is not always necessary to use hemispherical surfaces such as those provided in the metal molds 01 and 02, the object for obtaining a hemispherical surface can be attained by partially supporting the thin sheets at about three points.

Detailed Description Text - DETX (63):

FIG. 32 is a side view of the femoral stem AH2. In the middle section of the femoral stem AH2, a femoral stem porous lamination component accommodation enation AU12 is provided around the entire circumforence of the stor AU2 in a





US-PAT-NO: 4524467

DOCUMENT-IDENTIFIER: US 4524467 A

See image for Certificate of Correction

TITLE: Apparatus for constraining a socket

bearing in an

artificial joint

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Brief Summary Text - BSTX (7):

In order to increase the inherent stability against dislocation of such

semi-constrained constructions, it has become conventional to add a cylindrical

portion to the hemispherical socket to make it deeper.

Although the ball is

not physically constrained by the socket by this adjustment, the ball does have

further to travel than if just a hemisphere had been used and thus some

reduction in the propensity towards dislocation is achieved. Ball and socket

joints of this type generally provide an arc or range of motion of

approximately 115.degree. when a 28 mm diameter sphere is used and the socket

is made a few millimeters deeper than a hemisphere. Larger ranges of motion

can be obtained by keeping the size of the arm attached to the ball constant

and increasing the diameter of the ball. In this way, the angular extent of

the arm relative to the ball becomes smaller. In the limit, if the ball could

be made progressively larger and larger, a range of motion approaching

180.degree. could be achieved. In practice, however, the largest sphere in

common use in artificial joints, and in particular artificial hip joints, has a

diameter of 32 mm and provides a range of motion of approximately 120.degree..

It should be noted however, that such larger sphere sizes are not universally favored because frictional torque increases with diameter.

Brief Summary Text - BSTX (11):

An example of a constrained artificial joint employing a plastic bearing is shown in Noiles, U.S. Pat. No. 3,996,625. As can be seen in FIG. 1 of this patent, a plastic bearing 17 fitted with a metalreinforcing band (un-numbered) extends beyond the diameter of the ball 24 so as to physically constrain the ball within the bearing. The bearing itself is attached to fixation element 12. The metal reinforcing band is assembled over the lip of the opening of bearing 17 after that bearing has been forced over sphere The reinforcing band increases the force required to dislocate the joint. In practice, the design shown in FIG. 1 of U.S. Pat. No. 3,996,625 has been found to provide a range of motion of approximately 85.degree. when a sphere diameter of 28 mm is

used and to resist direct dislocating forces of several

Brief Summary Text - BSTX (13):

hundred pounds.

A constrained construction using a metal socket bearing is shown in Noiles, U.S. Pat. No. Re. 28,895 (reissue of U.S. Pat. 3,848,272). This construction provides approximately a 90.degree. range of motion when the sphere diameter is 28 mm. In a practical sense, the metal bearing can be said to be non-dislocatable. The force required to extract the metal sphere from the enclosing metal socket bearing is more than several thousand pounds. Accordingly, in use, rather than the metal ball dislocating from the metal socket bearing, any overly severe dislocating leverage will cause the fixation element to be disrupted from the bone in which it has been

embedded.

Detailed Description Text - DETX (11): In general, cup 14 is approximately a hemisphere. Ball 10 can rotate until neck 16 is almost against the rim of the cup. When the diameter of the ball is approximately the 28 mm in common use, and the socket bearing wall thickness is approximately 7 mm, the inner diameter of the cup, and thus the outer diameter of the bearing, is approximately 42 mm (28 mm+7 mm+7 mm). Accordingly, on an overall basis, the joint functions as if it had a 42 mm ball operating in a cup of hemispherical depth. This gives the joint a range of motion in the plane through lines S--S somewhat greater than 135.degree., depending on the design of neck 16.

Detailed Description Text - DETX (12): When ball 10 and neck 16 move in the direction of the greater opening in the socket bearing, their motion is limited by contact of neck 16 with webs 106 of bearing 12. That is, the neck of the prosthesis can move in the plane through lins P--P of FIG. 1 from a position of contact with lower web 106 to contact with upper web 106. To allow clearance for the movement of the neck and ball, the flat sides of the stub pins 34 are preferably beveled inwardly as shown at When ball 10 has a diameter of 28 mm, the outer diameter of bearing 12 is 42 mm and beveled stub pins 34 are used, the arc or range of motion of neck 16 in the plane through lines P--P is somewhat greater than 135.degree., depending on the design of the neck 16.

Detailed Description Text - DETX (18):
Projection 50, in combination with aperture 13 formed in outer surface 22 of

bearing member 12, serves to constrain the rotation of bearing 12 so as to prevent the bearing from being rotated out of the spherical cavity once the joint is assembled and to limit the rotation of the bearing so as to keep neck 16 just out of contact with the rim of ring 74, e.g., on the order of a half a millimeter above the rim. In particular, bearing 12 can rotate only to the point where polar pin 50 and one of the end walls 52 or 54 of aperture 13 are in engagement. As discussed below, this constrained condition for bearing 12 occurs automatically as the joint is assembled without any additional assembly steps. Also, the constraining of socket bearing 12 within the joint is accomplished irrespective of the angular orientation chosen for retaining ring 74 with respect to body portion 64 of cup 14.

Detailed Description Text - DETX (23): For hip joints, the possibility of a number of orientations for the axis of rotation of bearing 12 is used to place that axis in an orientation in which the greater required range of motion is aligned approximately with axis P--P. For example, the axis of rotation can be oriented upward in the forward direction to achieve this result. In this way, almost all of the highly repetitive load bearing motions of the joint will occur along or close to this axis. As discussed above, motions along or near to the axis of rotation of bearing 12 consist primarily of ball 10 moving in bearing 12, rather than bearing 12 moving in cup 14. As also discussed above, the frictional torques involved further favor movement of ball 10 in bearing 12. Accordingly, by placing the axis of rotation of bearing 12 in a favorable orientation, most repetitive motion will occur by movement of ball 10. This gives the joint low

friction in that friction increases with the diameter of the moving member and ball 10 has a smaller diameter than bearing 12. Put another way, by orienting the axis of rotation of the bearing 12 in the manner described above, the joint exhibits the frictional behavior of a small ball, e.g., a 28 mm ball, for the great majority of motions of the patient's limb, while providing a range of motion corresponding to a large ball, e.g., a 42 mm ball.

Current US Original Classification - CCOR (1): 623/19.12

